Remarks

Claims 21-30 are pending upon entry of the foregoing amendments.

Amendments to the Claims

Claims 21 and 28 have been amended to specify that each of the at least two flow field paths are dimensioned to *provide a molar flow rate of a reactant through the flow field path proportional to the electrochemical surface area serviced* by the flow field path. Support for this amendment is found in the specification at paragraphs [0019] and [0032] (see Patent Application Publication No. 2004/0265675 A1).

Rejections Under 35 U.S.C. § 102

Claims 21-24, 26 and 28-30 were rejected under 35 U.S.C. § 102(b) as anticipated by U.S. Patent 5,686,199 to Cavalca et al. (hereinafter "Cavalca"). Claims 21-28 and 30 were rejected under 35 U.S.C. § 102(e) as anticipated by U.S. Patent 7,067,213 to Boff et al. (hereinafter "Boff"). The rejections are respectfully traversed as applied to the amended claims.

Applicants' Fuel Cell Flow Field Plates

Applicants teach that "[p]rior art flow field paths with substantially equal lengths and the same number of bends, however, may not have substantially equal reactant flow because of differences in the locations of the bends along the paths. A fluid path with bends offers more resistance than a straight fluid flow path of the same total length. [For example, i]n the hydrogen-bearing flow field plate, gas in one path may travel less far before encountering a bend than in another path, and may thus have undergone less reaction and contain more hydrogen to flow through the bend, and may thus experience more flow resistance in the bend than the other

path. In this case, the former path has a total resistance greater than the latter and will actually experience less flow." ¶ [0032].

It is "desirable or convenient to design fuel cell flow fields with significantly different path lengths and path geometry, which would have markedly different flow resistances." ¶ [0013]. Applicants have developed a flow field design to enable uniform current density even where the path lengths are different and geometries are complex among the flow paths. The claimed fuel cell has a flow field plate comprising two flow field paths that have path lengths different from one another, yet is dimensioned to provide a molar flow rate of a reactant through the flow field path proportional to the electrochemical area serviced, such that the at least two electrochemical surface areas of the flow field plate have a current density equal to one another.

Cavalca

Cavalca discloses a fuel cell having substantially symmetric flow sectors including substantially parallel flow channels subdivided into a plurality of sets of flow channels. The average path length that the reactant gases follows through any of the sectors is substantially the same to expose each portion of the flow field to the same flow conditions and pressure drop. Cavalca fails to disclose a flow field plate that has at least two flow field paths having *different lengths* from one another which are *dimensioned to provide a molar flow rate of a reactant proportional to the electrochemical area serviced* by the flow field path. Rather, Cavalca requires the same path length and furthermore fails to provide a molar flow rate of a reactant proportional to the electrochemical area serviced. Applicants have described that prior art attempts to provide equal flow resistance using flow channels have substantially equal lengths and the same number of bends. Cavalca plainly illustrates such a design, because it discloses

what appear to be symmetric flow sectors having the same average path lengths, yet does not provide a molar flow rate of a reactant proportional to the electrochemical area serviced by the flow field path. For instance, unequal flow resistance would result when the reactant flowing to the second flow sector (46B) must travel through a long straight flow channel (58B) before encountering a bend while the reactant to the first flow sector (46A) does encounters a bend much closer to the inlet. Thus, Applicants' claims are novel over Cavalca.

Boff

Boff discloses a flow field having a network of progressively finer channels. Boff fails, however, to disclose a flow field plate that has two flow field paths that have different lengths from one another yet are dimensioned to *provide a molar flow rate of a reactant proportional to the electrochemical area serviced,* such that the at least two electrochemical surface areas of the flow field plate have a *current density equal to one another*. In fact, Boff is devoid of any disclosure that would enable one ordinarily skilled in the art to determine relative lengths of two flow field paths or the molar flow rate through a flow field path. Applicants' claims thus are novel over Boff. The novelty rejections should be withdrawn.

Rejection Under 35 U.S.C. § 103

Claims 21-30 were rejected under 35 U.S.C. § 103(a) as obvious over U.S. Patent 6,780,536 to Debe et al. (hereinafter "Debe"). The rejection is respectfully traversed as applied to the amended claims.

Debe

Debe discloses a fluid distribution assembly having a flow field device and a fluid transport layer disposed between the flow field device and a target area. Debe discloses a

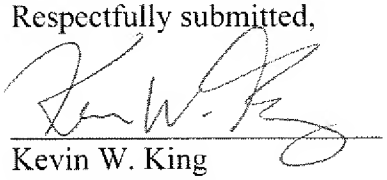
channel having parallel courses and the target area being divided into portions served by the channels. Like Cavalca, Debe is another example of the prior art designs for providing equal flow resistance by using flow channels having substantially equal, and the same number of, bends. Debe discloses that the target area can be divided into portions but is no different than the teaching of Cavalca. See Fig. 18, which is the only example of a plate having multiple channels; these channels appear to be equal in length. Debe provides absolutely not motivation or suggestion of modifying the Debe flow field plate to derive Applicants' claimed flow field plate. Nothing in Debe or the prior art as a whole suggests designing a flow field plate that has at least two flow field paths having *different lengths* from one another, yet are dimensioned to provide a *molar flow rate* of a reactant *proportional* to the *electrochemical area serviced* such that the at least two electrochemical surface areas of the flow field plate *have a current density equal* to one another. Applicants' claimed fuel cell is therefore non-obvious. The obviousness rejection should be withdrawn.

Conclusions

The claims as amended are patentable over the prior art of record. Allowance of each of the pending claims 21-30 is therefore respectfully solicited.

The undersigned kindly invites the Examiner to contact him by telephone if any outstanding issues can be resolved by conference or examiner's amendment.

Respectfully submitted,



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